

CLAIMS

What is claimed is:

1. A focus ring assembly for surrounding a substrate on a substrate holder in a plasma processing system comprising:
a centering ring configured to be coupled to said substrate holder; and
a focus ring comprising an upper surface, a lower surface, and one or more wear indicators coupled to at least one of said upper surface and said lower surface, wherein said focus ring is configured to be centered about said substrate by coupling said focus ring to said centering ring.
2. The focus ring assembly of claim 1, wherein said centering ring is coupled to said substrate holder by at least one of said centering ring resting atop said substrate holder, said centering ring being mechanically clamped to said substrate holder, and said centering ring being electrically clamped to said substrate holder.
3. The focus ring assembly of claim 1, wherein said centering ring comprises a centering feature configured to center said focus ring on said centering ring.
4. The focus ring assembly of claim 3, wherein said centering feature comprises at least one of a centering pin, a centering receptacle, and a centering edge.
5. The focus ring assembly of claim 3, wherein said focus ring comprises a mating feature configured to be coupled with said centering feature.
6. The focus ring assembly of claim 5, wherein said mating feature comprises at least one of a centering pin, a centering receptacle, and a centering edge.

7. The focus ring assembly of claim 1, wherein said focus ring is made from at least one of silicon, quartz, silicon carbide, silicon nitride, amorphous carbon, alumina, sapphire, polyimide, and Teflon.

8. The focus ring assembly of claim 1, wherein said one or more wear indicators comprises a hole in said upper surface and extending to a depth from said upper surface, said depth comprising a fraction of the distance between said upper surface and said lower surface.

9. The focus ring assembly of claim 1, wherein said one or more wear indicators comprise a hole in said lower surface and extending to a depth from said lower surface, said depth comprising a fraction of the distance between said upper surface and said lower surface.

10. The focus ring assembly of claim 8 or 9, wherein said depth for each of said one or more wear indicators varies from one wear indicator to another wear indicator.

11. The focus ring assembly of claim 1, wherein said centering ring is made from at least one of aluminum, coated aluminum, silicon, silicon carbide, silicon nitride, amorphous carbon, alumina, sapphire, polyimide, and Teflon.

12. The focus ring assembly of claim 11, wherein said centering ring is made from coated aluminum and comprises at least one of surface anodization, a plasma electrolytic oxidation coating, and a spray coating.

13. The focus ring assembly as recited in claim 11, wherein said centering ring is made from coated aluminum and comprises a coating having at least one of a III-column element and a Lanthanum element.

14. The focus ring assembly as recited in claim 11, wherein said centering ring is made from coated aluminum and comprises a coating having

at least one of Al_2O_3 , Yttria (Y_2O_3), Sc_2O_3 , Sc_2F_3 , YF_3 , La_2O_3 , CeO_2 , Eu_2O_3 , and DyO_3 .

15. A disposable focus ring for surrounding a substrate on a substrate holder in a plasma processing system comprising:

a ring configured to be coupled to said substrate holder comprising an upper surface, a lower surface, and one or more wear indicators coupled to at least one of said upper surface and said lower surface,

wherein said ring is configured to be centered about said substrate by coupling said ring to said substrate holder.

16. A method of replacing a focus ring surrounding a substrate on a substrate holder in a plasma processing system comprising:

removing a first focus ring from said plasma processing system; and

installing a second focus ring in said plasma processing system by coupling said second focus ring to said substrate holder, said coupling facilitating auto-centering of said second focus ring in said plasma processing system,

wherein said first focus ring and said second focus ring each comprise an upper surface, a lower surface, and one or more wear indicators coupled to at least one of said upper surface and said lower surface.